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Virology

Studies of Psychophysiological Adaptation On Board "MIR"

927C0168A Moscow KRASNAYA ZVEZDA in English 30 Nov 91 p 1

[Unattributed article]

[Text] Flight Control Center, November 29 (TASS)—The last two days of Aleksandr Volkov and Sergey Krikalev's work week are reserved for medical experiments whose purpose is to obtain additional information about the condition of the human organism during stays of different durations in conditions of space flight.

Studies of cosmonauts' psychophysiological reactions and working fitness are being conducted with the aid of Austrian equipment, and effects of weightlessness on movement control mechanisms and interaction of organs of vision with the vestibular apparatus are being evaluated. Numerous physiological parameters are being recorded in the course of experiments, with the aid of a central computer.

The work in near-Earth orbit is continuing.

New Line of Black Pied Breed

917C0659A Moscow MOLOCHNOYE I MYASNOYE SKOTOVODSTVO in Russian No 2, Mar-Apr 91 pp 34-38

[Article by G. Turbina, chief breeding zootechnician, Central Station for Artificial Insemination of Livestock, D. Karlikov, doctor of agricult. sciences, and A. Petlyakov, candidate of agricultural sciences, All-Union Scientific Research Livestock Institute]

[Abstract] A new line of Black Pied breed of dairy cattle have been developed, with the progenitor identified as a Holstein bull Master 001 MChP-1868. Best milk producers in the line yield from 4400 to 6000 kg of milk per year with a fat content of at least 3.6 percent. The genotype of this line is free of recessive traits and the fertility index of the bulls is on the order of 93.2 percent. In the Moscow Oblast the cost effectiveness of the breed has been estimated at 423,800 rubles; preservation of this line will require breeding inbred bulls and homozygotic selection. Figures 2; tables 1.

Embryo Transplantation in Livestock Breeding

917C0659B Moscow MOLOCHNOYE I MYASNOYE SKOTOVODSTVO in Russian No 2, Mar-Apr 91 pp 41-43

[Article by M. Maltseva]

[Abstract] One of the new methods of increasing the production of beef and dairy cattle has been embryo transplantation, a technique slow in gaining popularity in the USSR although the first calves using this method in the USSR were obtained in 1977. Abroad, however, the technique has found extensive acceptance and in the US the number of calves obtained by this method has increased from 25,000 in 1980 to 100,000 in 1985. The key advantage of this approach is the amplification of the breeding potential of a desirable donor. Whereas one cow can produce 4-5 embryos per year, the use of hormonal stimulation of ovulation and embryo transplantation can increase the yield of calves to 30 or more per year. In addition, the percentage of twin births can be increased to 30-50 percent from a normal of 0.5-3 percent, and selection of male embryos can be used to increase beef production by 10 percent. In short, embryo transplantion in cattle has become a technique that has revolutionized cattle breeding and further developments can be anticipated to transform this technique into a routine operation.

Natural Plant Resources of Turkmenistan and Their Protection, Restoration, and Sensible Use

927C0082 Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK in Russian No 3, May-Jun 91 (manuscript received 27 Feb 91) pp 38-44

[Article by A. I. Gladyshev, Institute of Botany, TuSSR Academy of Sciences]

UDC 630.166.1 (575.4)

[Text] The natural features of Turkmenistan that are responsible for the arid climate and for the complex combination of landforms consisting of expansive plains, mountain systems, flatlands near mountains, and river valleys have created the conditions needed for the appearance and growth of its unusual vegetation. The natural plant resources of the republic consist in food groups of plants, feed groups, medicinal groups, industrial groups, and other groups. At present, nearly 400 of the 2,700 species of higher flowering plants of the flora of Turkmenistan have been singled out as beneficial. In recent years, many new, previously unused plants entered the ranks of resource plants (primarily, food and medicinal plants). The beneficial plants are not equal in terms of their resource potential, the spectrum of their beneficial properties, or the possibilities of their agricultural use. On the whole, the coefficient of use of the natural plant resources remains low. What explains that? First, the biological resources of many beneficial plants are not identified to a full enough extent, and their chemical composition, areas of growth, and quantities have not been studied. Second, until recently, the economic interests of the republic were weakly oriented toward intensive use of plant potential. Third, the natural resources of many plants are so limited that creating a stable raw-material base requires systematic research into their being grown as crops and then the organization of specialized farms for growing them on an industrial basis.

A very important, sometimes decisive, factor that is hindering the use of the natural resources of the republic is a factor associated with the social aspects of our use of the environment and with the ever-present ecological stress in desert biogeocenoses. The natural features of the region limit, and narrow extremely, the biological potential of the plants. That pattern is typical not only of rare or relatively rare plants, but also of resource plants occupying relatively large areas and distinguished by considerable reserves of biomass. The geographic regions of Turkmenistan have unique features in terms of the floral composition of vegetation, in terms of factors that determine the resource levels of beneficial species, and in terms of the nature of their sensible (sparing) use.

Mountains. One of the main patterns found in the arid zone of Asia consists in the wealth of species of flora and fauna that stretches from the plains to the mountains. For example, the mountainous part of Turkmeniya contains more than 60 percent of the republic's flora—nearly 1,680 species. The flora's being replete with species of ancient Eastern/Mediterranean, Iranian, and Central Asian genera makes for a compositional variety among the beneficial plants. The mountainous territories also attract unique forest ecosystems. The natural mountain forests of Turkmeniya, in addition to their economic value, are extremely important in terms of soil protection and water conservation. However, the constant cutting, the fires, and the overgrazing have done irreparable damage to them. Particularly hard hit are the

juniper stands (species of the genus *Juniper* L.) and the pistachio stands (*Pistacia vera* L.). At this time, forest management in the republic is devoting a great deal of attention to the restoration of those stands, although, on the whole, the problem of artificial forestation of mountain slopes and other degraded plots has yet to be solved. The restoration of the nut-bearing forests is also important because they are sources of biologically active substances and hold promise as medicinal plants. All species of hawthorns and barberries are rich in biologically active substances. The study of elecampane, immortelle, *Ferula, Dorema,* fleabane, and many other plants holds promise.

The fact is that despite the huge successes achieved in the area of synthesis of medicinal preparations, medicines from plants continue to hold an important place in modern scientific and folk medicine. As a result of the study of the medicinal plants of the flora of Turkmeniya, nearly 30 species that hold promise as sources of raw material for new drugs as well as drugs already in use have been proposed to the practice of medicine.[8,9]

A prominent role among the beneficial plants of mountainous Turkmeniya is played by bushy plants. The fruit of *Rosa canina, R. beggerana,* and *R. corymbifera* are excellent sources of multivitamins. The raw-material resources of the dog rose have not been adequately studied.

Of great importance are the ephedras, particularly the horsetail (*Ephedra equisetina*), a valuable medicinal plant. Confined to the mountain ecosystems are the industrially valuable species of the genus *Acanthophyllum,* and sources of the raw material for the Turkestan soaproot. Long-term use has severely depleted reserves of the raw material of *A. glandulosum* and *A. mucronatum* in the Kopetdag system and *A. gypsophylloides* in the Kugitang system. The TuSSR Academy of Sciences Institute of Botany has corroborated the theory for and has introduced into production a fundamentally new approach to the growth of soaproot on the unirrigated lands of the Kugitangtau ridge. The *A. gypsophylloides* plantations created in the Kugitang system are making it possible to change the protected status of the plant, which had been listed in the regional and Union Red Books.

Of great economic interest in the Kopetdag system are the tragacanth astragaluses. The long-term procurement of the gum of *Astragalus turkmenorum* and *A. pulvinatus* has also led to the depletion and alteration of the structure of that unique group of highland xerophytes. Resource-management studies on the Solyukli-Prokhladnenskiy massif have shown only a partial restoration of the tragacanths, even though procurement of the gum stopped more than 30 years ago.

At present, the republic's food industry is using the raw material of 53 species of plants, 42 of which are mountain plants. The resource significance of wormwoods has grown considerably. As good essential-oil plants, they have come to be widely used as components in the formulas of new nonalcoholic beverages, quality wines, and balsams.[15] Among them are mountain species—*Artemisia kopetdaghensis, A. balchanorum,* and *A. turcomanica.* The possibilities for procurement of wormwood raw material in the republic are virtually unlimited.

Among the beneficial wild plants in the flora of Turkmeniya, the preeminence of medicinal herbs is indisputable. From the medicinal flora of the Central Kopetdag system, 40 species have been proposed to medical practice as sources of raw material for official treatment preparations.[9] The uniqueness of the mountain flora makes possible a considerable expansion of the assortment of plants suitable for scientific research aimed at using them in the economy.

Occupying nearly 10 percent of the land area of the republic, the mountain ecosystems could become an important part of its economy. However, at present, there needs to be a dramatic improvement in the protection of the natural plant resources of the mountain territories and in their sensible use, especially for the woody plants, which have suffered the most under man's hand.[16]

Valleys and floodplains. Turkmeniya is not rich with rivers. The hydrographic network is most developed in the southern part of the republic in the vicinity of the Kopetdag and Paropamiz systems (the Murgab, Tedzhen, Atrek, and Sumbar rivers and small mountain rivers). The eastern part of the republic is traversed by the Amudarya River, the river carrying the most water in Central Asia.

The valleys and floodplains of the large and small rivers of Turkmenistan are, at the current stage of development, undergoing profound changes that are creating difficulties in terms of the sensible use of their natural resources. Those phenomena are primarily associated with anthropogenic management: runoff regulation and construction of flood-prevention engineering structures, irrigation channels, and, among other things, drainage channels. In today's floodplains, processes of desertification are active. Changes in the phytocenotic environment are resulting in a profound, often irreversible restructuring of the natural conditions and the plant and animal world closely related to those conditions. In connection with that, issues associated with the protection and sensible use of the natural resources in the floodplains of the rivers are acquiring prime importance in our time.

A unique, clearly visible feature of the floodplain terrain of the desert zone consists in the tugai plant communities. From a farming standpoint, they represent an important source of farmland and grazing land and the raw material for a number of valuable industrial and medicinal plants. In recent decades, the tugai lands, as balanced ecological systems, have been subjected to massive anthropogenic factors. The productive activity of man often leads to a radical restructuring of the tugai

phytocenoses, amplifies the processes of their desertification, and dramatically lowers the biological and agricultural productivity of the tugai complexes. A typical example of that is the degradation of the vegetative cover in the lowlands and deltas of the Amudarya, Sumbar, and Atrek rivers, as well as of other large and small rivers of the republic.[2,12] In those conditions, a large role in the preservation and enrichment of the tugai ecosystems must be played by preserves, sanctuaries, and forest reserves, where the protection of nature must become a means of controlling the natural resources.

At present, the tugai complex is most completely represented in the middle river valley of the Amudarya, where it occupies nearly 30,000 hectares. A sound program for the sensible use of natural resources in the tugai lands—one that includes protection, reclamation techniques, and a system of monitoring and control—is in the initial stages of development. But it is already clear that the sensible use of natural resources of the tugai lands is possible only on the basis of the use of intensive technology for restoring and improving them. One would expect an improvement of forest conditions, the vigorous restoration of woody plants, enhancement of their reclamation-protective functions and health-promoting conditions, an increase in the role of cereal-licorice communities in the structure of herbage, and an attenuation of the desertification processes.[1,4]

In summarizing the experience that has been garnered, one can note the basic principles of sensible use of natural resources in the tugai ecosystems based on (a) the improvement of the hydrological conditions of the territory so that they are as close as possible to the natural optimum; (b) the high regeneration activity of dominants of the vegetative cover of the tugai lands and in conditions of inundation corresponding to the demutation of communities with a given agricultural productivity; (c) the improvement of natural herbages via the introduction of economically valuable plants that are resistant to flooding; (d) the renewal of the qualitative composition of tugai forests, the elevation of their productivity, the increased monitoring of the protection and sensible use of forest resources, the more effective use of forest lands, and the increase in the volumes of work done in protective afforestation.

One of the clearest representatives of the tugai flora of the Amudarya is the licorice *Glycyrrhiza glabra,* a valuable medicinal and industrial plant. For more than 50 years, licorice root has been the target of steady domestic export. Annual procurement of licorice root is nearly 22,000 tons. More than 73 percent of the root is procured in Turkmenistan, in the Amudarya valley.[10] In recent years, natural thickets of licorice, which are the main raw-material base of the sector, have considerably diminished everywhere, and their agricultural productivity has dropped sharply. The TuSSR Academy of Sciences Institute of Botany has developed and introduced into production reclamation and agrotechnical measures that make it possible to raise the average reserves of root mass of licorice plantations to 10-12 tons/ha.[11] Preserving and maintaining natural licorice communities in proper condition must always be given priority attention, because they will long remain an important raw-material base and a natural source of plant and seed material.

Representing an important resource in the Amudarya floodplain are the long-stemmed, giant grasses—a source of reed raw material, which is widely used by the local population as an additional building material. Those grasses are, first of all, the giant, bunch grasses that are relicts of the tertiary flora *Erianthus ravennae* and *Saccharum spontaneum.* The formations of bunch grasses are very typical of the vegetative cover of the Amudarya floodplain. The dominants of the phytocenoses create an unusual, unrepeatable aspect against the general backdrop of intensively developed tugai vegetation. Covering large areas, the wild sugar cane and the *Erianthus ravennae* are extremely productive of an above-ground phytomass.[5] That group of raw-material plants includes the southern cane (*Phragmites australis*), imperata (*Imperata cylindrica*), and representatives of the genus *Typha.* Cane communities are capable of developing enormous biomass that reaches more than 1,300 centners/ha dry mass. Even higher are the reserves of above-ground phytomass in *Typha elephantina* communities—1,440 centners/ha.[3] However, it should be noted that, as a result of anthropogenic factors, the resources of reed raw material in recent years dropped to less than a third of what it was. Methods have been developed for the sensible use of thickets of large-stemmed grasses, as have the agrotechnical bases for their cultivation.[7] The restoration of natural thickets of giant grasses must be regarded as an important component in the complex of environmental protection measures for the tugai ecosystems.

Lowland ecosystems. This category refers to sandy deserts and the flatlands near the mountains, which occupy more than 80 percent of Turkmenistan. The natural processes are due here to a prevalence of sandy-desert terrains, open relief, and the dryness of the climate. Unlike the mountain territories, the lowland ecosystems are relatively poor in terms of the composition of beneficial wild plants, whose significance as objects of economic use is, nevertheless, difficult to overestimate.

The most typical representatives of beneficial plants of the desert flora are wormwoods. The ecological niche of the wormwoods covers virtually all the floral regions of the republic. The broad range of pharmacological action of the biologically active substances of the wormwoods of Turkmeniya and the unique composition of their essential oils has fostered their study as medicinal and food plants. Among the wormwoods growing in the sandy desert and that have found use in the formulas for new nonalcoholic beverages are the sand-loving wormwood (*A. arenicola*) and the santalin wormwood (*A. santolina*) from the subgenus *Seriphidium*; they cover

tens of thousands of hectares in the Central and Zaunguzsk Karakum, producing a raw material mass of 1-8 centners/ha dry phytomass.

Promising as a raw material plant for the perfume industry is the Keller wormwood (*A. kelleri*) from the subgenus *Dracunculus.* Cultivated thickets of that wormwood covering 45,000-50,000 hectares have been tested in the sands of Chilmamedkum. They produced 0.6-2.2 centners/ha raw material mass. Often encountered in the near-mountain flatlands is the wormwood annual (*A. annua*). The possibility of producing artemisin from the above-ground mass of the annual wormwood led to its introduction into cultivation.[13] It has been grown at a sovkhoz for medicinal plants near the Tedzhem since 1987.

In terms of their biological nature, wormwoods are primarily mesotherms with a clearly expressed stage of summer dormancy. They exist only as a result of the atmospheric moisture, which is why the state of the wormwoods (annual productivity) depends on the weather conditions of the winter-spring period. The productivity of the above-ground phytomass of wormwood in wet years can be 10 times higher than in dry years. That is why the harvest forecast for wormwood communities, based on perennial dynamic observations, is of prime importance in desert ecosystems.

Representatives of the genera *Ferula* and *Dorema* are promising for the production of a number of very important medicinal preparations. The medicinal properties of *Ferula* were known in antiquity. Gums—*Ferula* resins known by the names "assafetida" and "galban"—are used in the folk medicine of many countries of Asia, and they are used in certain official drugs on the European continent.

The main resource species of the genus *Ferula,* widespread in Zaunguzsk Karakum and western Turkmeniya, is the assafetida *F. foetida.* One of the fields of its thickets was tested in the Zaunguzsk Karakum, in the vicinity of Kyrnuy, Boburdeshik, Damla, and Akbashly wells. The nearly 50,000-hectare land area there with the total reserves of raw-material mass of assafetida accounts for as much as 180 tons of above-ground phytomass and 52,000 tons of underground phytomass in terms of air-dried raw material. In light of the year-to-year dynamics in the seed renewal of the plants and the age composition of the population of the assafetida, it is recommended that annual procurement of the raw material cover ⅛ of the land area for the purpose of establishing sparing use of the thickets.

Good resin- and essential-oil-bearing plants, certain species of the genus *Dorema* are promising as resource plants. The mountain species *D. aitchisonii* and *D. hyrcanum* are widely used in fold medicine for various stomach ailments. The desert plant (*D. sabulosum*) is found to contain resins, an essential oil, coumarins, and flavonoids, which makes it an interesting subject for in-depth resource research.[8]

An important insecticidal plant of the flatlands of Turkmeniya is the leafless *Anabasis aphylla.* In the Tashauz Oblast, there are some 3,000 hectares of Predustyurtye takyr-like gray desert soil beneath thickets of anabasis. The Caspian desert of northwestern Turkmeniya is a promising area for detailed research studying the natural resources of anabasis raw materials.[6]

Of great applied and theoretical interest are the licorice thickets of the Tashauz oasis that are unique in their own right. Isolated from the Amudarya floodplain by some 30-40 km, they do not form large tracts. The main industrial field of licorice is located on the M. Gorkiy sovkhoz (nearly 1,000 hectares) of the Kunya-urgencheskiy Rayon. Small tracts are found in the Telmanskiy and Kalininskiy rayons of the oblast.

The prospects for the development of the licorice sector of the economy in the republic should be based on the industrial cultivation of the plant. The many experiments, production tests, and economic calculations show that growing licorice is more advisable than exploiting its natural thickets. The possibility of using licorice in the cultivation of saline soils opens broad horizons for its cultivation on lands of secondary salinization in the zone of influence of the Karakum canal, as well as in the Chardzhou and Tashauz oases.[17]

In Turkmenistan, with the limited possibilities for natural plant resources, special importance attaches to the work involving the introduction of the more promising medicinal and other beneficial plants into industrial cultivation. The many years of research indicate that more than 150 species of plants can be cultivated, and then 40 of the most valuable plants are capable of producing high, consistent yields of raw material with elevated content of biologically active substances in the irrigated southern part of the republic.[14]

Thus, an analysis of the state of the natural plant resources of the most important beneficial plants of Turkmenistan shows that at present, the considerably increased anthropogenic factors have reduced the resource potential of such plants a great deal. At the same time, a systematic study of the flora of the republic has identified a large group of new plants that are promising as additional sources of medicinal raw materials, as well as raw materials for the food, perfume, refining, and other sectors of the national economy.

The sensible use of natural plant resources today is possible only on the basis of a sound system for their use, the application of intensive restoration technology, and introduction into industrial cultivation.

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Possibility of Applying the Immunoblot ("Western" Blot) Method for Detecting Antibodies to Bovine Leukemia Virus Antigens

927C0085A Vilnius EKSPERIMENTINE BIOLOGIJA in Russian No 3, 1990 pp 77-82

[Article by A. Veleckaite, N. Dikiniene, D. Adomaitiene]

[Abstract] An immunoblot ("Western" blot) procedure was developed for identifying the bovine leukemia virus (BLV) protein-specific antibodies in blood sera of cattle. Assay conditions were optimized and included an electrophoretic transfer of antigens to a nitrocellulose membrane (NCM), blocking the unbound sites of the NCM and detecting the NCM-bound primary immune complexes. A lysate of cells of a permanently BLV-infected FLK line (fetal lamb kidney) and purified BLV proteins were used as an antigen. The system permitted to identify the antibodies specific for BLV antigens in the sera of cattle ill with leukosis at a dilution of 1:1280. To sum up, "Western" blot is a highly specific and sensitive way of identifying antibodies in the sera of BLV-infected cattle.

Flash-Desorption—An Alternative to the Existing Methods of the Extraction of Organic Microcontaminants From Sorbents in the Gas Chromatographic Analysis of Polluted Air

927C0138A Moscow GIGIYENA I SANITARIYA, in Russian No 4, Apr 91 pp 78-79

[Article by V. I. Lyashenko, V. N. Chekal, and G. P. Trukhan; Kiev A. N. Marzeyev Scientific Research Institute (NII) of General and Communal Hygiene]

UDC 614.71-074:543.544

[Text] The problem of the complex influence of chemical factors in the environment, including polymer and paintwork materials, on the shaping of the health of the population has been acquiring ever greater significance in recent years. In this connection, it has become important to use tasks associated with the assessment of the quality of the environment using accessible physicochemical research methods.

The most frequently used means of gas chromatographic analysis of polluted air combines uneven front concentration of microcontaminants on various types of sorbents [1].

Extraction by the appropriate solvent of accumulated microcontaminants from the sorbents utilized is one of the simplest means of extraction of microcontaminants for their subsequent gas chromatographic analysis [2, 7, 14, 16, 19]. Thus it is necessary to include the high detectable minimum, which is associated with the analysis of the aliquot portion of the liquid sample, among the inadequacies of gas chromatographic analysis of microcontaminants, as are the incompleteness of extraction, as well as the possibility of overlapping by the extractant of chromatographic zones of the emergence of the contaminating components.

Thermal desorption as a means of extraction of microcontaminants is devoid of the above indicated deficiencies. However, as a rule, the stage of thermal desorption is complicated by the high sorptive activity of the sorbents used, which is manifested in the washing out of the initial chromatographic zone of emergence of the components being analyzed. In order to eliminate this deficiency, reconcentration of the microcontaminants from the samplers to cooled capillary condenser [9, 18] or into concentrators containing small weighted portions of sorbents, with subsequent extraction of the components to be analyzed by a solvent and by gas chromatographic analysis of the aliquot portion of the liquid sample [6], are utilized. At the same time losses of contaminant components in the unheated zones are possible, as well as their conversion as a result of prolonged heating, which substantially influences replicability, precision, and the sensitivity of the analysis.

We have investigated the possibility of using flash-desorption as a means of extraction of microcontaminants as an alternative to the above described techniques for the gas chromatographic analysis of polluted air. The essence of this method resides in a one-time injection of the organic microcontaminants concentrated on the solid sorbent into the analytic column, which prevents the washing out of the zone of emergence during gas chromatographic analysis. This is achieved through the rapid thermal desorption of the components being analyzed over the course of a short time interval, which is favored by the small weighted portions of the sorbents utilized; these are characterized by the absence of specific interactions with the substances to be sorbed. At the same time, special thermal desorbers are used, which have been partially described in the study [15], and devices for the direct injection of the sample to be analyzed into the chromatograph [11].

The temperature of the thermal desorption may range, depending upon the nature of the contaminants to be analyzed, within wide limits, all the way to 440°C. At the same time, destruction of the organic substances is not observed at the indicated temperature and with the brief period of heating of the high-temperature sorbents [10].

Flash-desorption in combination with direct chromatographic analysis has been used in some specific cases, for example for the analysis of methylsalicylate and its 2,2-dichloroethyl ester [5], as well as of monoethanol ethylenediamine [4] in the air.

However, polluted air is a substance which is complex in its component composition and therefore it seemed of interest to study the practical possibilities of the above described method of analysis.

With this aim in mind, we carried out laboratory and natural investigations using "Sterling 3000 MT" graphitized carbon black as the sorbent. Sorbents which are similar in their sorptive properties, for example carbochrom [karbokhrom] [3] and Carbopack B [8], have been previously used for the analysis of polluted air.

Since the flash-desorption of microcontaminants can be achieved using small weighted portions of sorbents, we investigated the sorptive activity of samplers containing 320, 170, 150, and 80 mg of the sorbent to be studied, granulation 0.1-0.25 mm.

The utilization of small weighted portions of sorbents had already come into practice in the determination in the atmosphere, for example, of methyl and butyl alcohols (BAU activated charcoal, weighted portion 200 mg) [2], of aromatic and halogenated hydrocarbons (Tenax GC - 130 mg) [12], ethyl formate (activated charcoal - 50 mg) [13], nitromethane (activated charcoal -150 mg) [14], as well as 2-ethyl hexanone (Chromosorb 102 - 100 mg) [17].

The completeness of the sorption of microcontaminants by samplers with the above-indicated weighted portions of sorbent was investigated at rates of aspiration of the artificial gaseous mixture of 300 and 500 cm^3/min. The mixture was prepared by the dynamic gas method. The thermal desorption of the collected components was

studied through heating of the samplers from 20°C up to 360°C over the course of 45 sec, and the concurrent passage through them of a stream of helium at a rate of 43 ml/min. Under such desorption conditions, no changes in the qualitative and quantitative composition of the artificial steam and gas mixture of the substances presented in the table was observed, which is confirmed by the results of the mass spectrometric and gas chromatographic investigations of the reference and desorption mixture of components.

Table 1. Sorption Characteristics of Samplers With Various Weighted Samples of "Sterling 3000 MT" Graphitized Carbon Black, M+/-m

Component investigated	Interval of concentrations investigated, mg/m^3	Sorption, %		Desorption, %	
		weighted sample of sorbent, mg			
		150	80	320	270
Formaldehyde	0.55-0.063	43.9+/-1.0	10.5+/-0.9	89.7+/-5.0	95.3+/-3.4
n-Pentane	0.31-0.040	41.4+/-1.5	7.5+/-0.7	76.3+/-2.5	85.2+/-4.2
Proprionic aldehyde	0.35-0.022	56.6+/-2.4	29.9+/-0.8	92.7+/-2.0	100+/-3.4
n-Hexane	0.90-0.012	40.6+/-2.6	25.7+/-0.4	90.3+/-1.5	97.3+/-4.2
n-Butane	0.44-0.005	86.6+/-1.3	80.2+/-0.3	90.0+/-3.0	100+/-4.8
Methyl butyl ketone	0.66-0.078	73.8+/-3.7	58.7+/-1.0	92.0+/-2.0	95.4+/-3.2
n-Octane	0.24-0.023	76.7+/-2.3	62.6+/-0.6	97.0+/-2.1	93.3+/-3.1
Ethylbenzene	0.47-0.038	63.2+/-2.8	42.3+/-1.0	87.0+/-2.0	95.4+/-3.2
Styrene	0.24-0.029	73.3+/-0.7	56.3+/-0.4	90.0+/-3.0	98.0+/-3.2
4-Methylpyridine	0.19-0.070	80.9+/-2.1	67.7+/-0.4	87.7+/-2.5	97.5+/-3.8
Amyl acetate	0.44-0.054	95.3+/-3.0	92.1+/-0.1	82.0+/-3.6	95.1+/-2.4
Propylbenzene	0.16-0.001	87.3+/-3.9	79.1+/-0.2	83.7+/-4.0	100+/-3.6
Mesitylene	0.24-0.004	62.1+/-4.2	38.8+/-0.4	93.0+/-3.6	98.1+/-2.4
Pseudocumol	0.35-0.016	71.2+/-0.6	51.7+/-3.2	91.3+/-2.5	100+/-3.6
Hemellitol	0.18-0.045	74.0+/-3.6	58.1+/-0.1	86.3+/-5.0	97.2+/-3.4
Phenol	0.34-0.004	86.2+/-2.6	73.9+/-4.4	85.0+/-5.0	100+/-4.2
2-Methylindene	0.10-0.002	80.1+/-2.8	68.1+/-1.6	90.0+/-4.6	98.6+/-4.2
Undecane	0.15-0.014	85.4+/-2.1	74.6+/-0.5	93.3+/-4.8	95.2+/-4.2
m, p-Cresol	0.12-0.040	92.3+/-3.0	88.2+/-1.7	71.7+/-2.1	89.1+/-3.6
Tetralin	0.16-0.018	62.7+/-2.4	39.2+/-1.2	70.0+/-1.5	91.0+/-2.5
Naphtalene	0.13-0.001	68.3+/-5.1	51.0+/-4.2	68.1+/-4.2	81.2+/-3.4

The sampler consisted of a tube of laboratory glass, 180 mm in length, and with an internal diameter of 3 mm. In order to inject the desorbed sample of microcontaminants through the vaporizer of the chromatograph into the analytic column, a special removable needle was used, while a connector-adapter was used for the connection of the sampler to the gas system of the instrument (a "Tsvet-100" gas chromatograph model). The sampler was fixed to these components by means of internally threaded clamps with silicone resin coverings. In carrying out the thermal desorption, the switching of the gas stream from the analytic column to the sampler was accomplished by means of an angle cock. The results of the investigations which were obtained suggest that the sampler with weighted portions of sorbent of 80 and 150 mg did not guarantee complete sorption of the microcontaminants from the air. With regard to weighted portions of the sorbent of 320 and 270 mg, their complete sorption is observed over the interval of concentrations of microcontaminants which we studied. However, the completeness of the sorption of microcontaminants deteriorates with an increase in the weighted portion of the sorbent.

The subsequent measurements made it possible to establish that the weighted portion of sorbent of 210 mg, which achieves 96 percent sorption of n-hexane at a rate of aspiration of air of 300 ml/min, and 98 percent desorption of naphthalene, is acceptable for practical use in the analysis of polluted air.

Objectively assessing the means of analysis of polluted air which we have tested, it is necessary to note that the complexity of identification of the analyzed components due to their great number is a substantial deficiency of this method.

In our own investigations of the atmosphere of living quarters and facilities of children's institutions, the identification of the components to be analyzed was made on the basis of the results of mass spectrometric studies performed on an MKh-1320 instrument, with the use of reconcentration, as well as on the basis of the values of the retention time, and of the heat of interaction with the immobile phase of temperatures, metered under programming operation at a rate of 4 and 8°C/min, respectively, from 50-150°C and from 70-170°C.

The quantitative calculations of the chromatograms was carried out relative to toluene, taking into account weighted correction factors, found through the analysis of solutions with a known concentration of the components to be analyzed in benzyl alcohol (from n-peptane to phenol, inclusive); for other substances with higher boiling points, their reference solutions were used.

The method of analysis tested by us is characterized by high sensitivity and by satisfactory replicability of results. The standard deviation did not exceed 15 percent at a specific minimum of 0.001 μg in the sample to be analyzed (with respect to naphthalene). The convergence of the retention time of individual components both with isothermal operation, as well as with temperature programming operation was 2-3 sec.

The results obtained suggest that flash-desorption, in combination with gas chromatographic analysis, can be used, in the interval of concentrations studied, to monitor atmospheric pollution. With regard to the interval of concentrations of the components polluting the atmosphere, in connection with the weighted portion of sorbent utilized, this characteristic can be corrected by the volume of the sample of collected air.

It should be noted in conclusion that the complications arising in the identification of microcontaminants polluting the atmosphere can hardly be successfully overcome in applied work without the use of special physicochemical methods of investigation which are thus far barely accessible.

However, the combination of gas chromatographic analysis with flash-desorption which we have studied can be successfully used for the determination of those chemical substances in the air which have been previously selected as the highest priority from the hygienic point of view.

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Vaccines in USSR Health Care. General Characteristics

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[Article by V. A. Lyashenko, Scientific Research Institute of Viral Preparations, USSR Academy of Medical Sciences, Moscow]

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[Text] The development and use of the first vaccines provided the basis for the development of immunology, which has now become a basic biological science. Vaccine prevention, which continues to exist as an independent discipline, grew and became more complex as immunology was developing. Knowledge of the current state of vaccine work is extremely important for the medical microbiologist and the physician; the objective of this article is to briefly provide some information on vaccines in the USSR. The basis for this survey consists in pharmacopeia articles that describe the preparation and monitoring of vaccine preparations and the methods of their use.

Forming the basis of immunoprophylaxis are the traditional vaccines—killed microorganisms, live attenuated microorganisms, and anatoxins. The practicing physician must have information about the contingent receiving the vaccination, the methods of use of the vaccine, how many times it must be administered, and the possibility and necessity of revaccination. A special issue is the vaccine's reaction patterns. As a rule, a vaccine is considered only slightly reactive if the total reaction to its administration consists in elevation of body temperature to 37.5°C for one to two hours. Acceptable (average) reactivity is elevation of temperature to 38.5°C; if the temperature rises higher than that or remains high for two days, the vaccine is considered highly reactive. If the side effects exceed those indicated in the prescribing information that attached to each package, the series may be defective and may need to be taken off the shelf. In some cases, the index for reactivity is the maximum percentage of those vaccinated who respond with a reaction of a given intensity to the administration of the preparation.

The classification of vaccines includes the nature of the agent (antibacterial or antiviral vaccines), its state (live or killed), and the requirements for use—vaccines against mass children's infections are mandatory for use, whereas the rest have epidemic indications or are used to vaccinate a contingent at risk.

Every pediatrician works with the mandatory vaccines, and adults need information about immunization schedules. There are seven such vaccines (some exist in two combinations): BCG vaccine, poliomyelitis vaccine, adsorbed DTP (diphtheria, tetanus, pertussis) vaccine, diphtheria-tetanus vaccine without the pertussis component, tetanus vaccine, parotitis vaccine, and measles vaccine. They are used in the following order.

The BCG vaccine is administered to healthy children intradermally five to seven days after birth; revaccinations are called for at the ages of seven, 11-12, 16-17, 22-23, and 27-30 years. Older individuals are revaccinated only in extraordinary cases. Revaccination is preceded by the Mantoux test and is performed only when the Mantoux test is negative, i.e., if the body is not in a state of nonsterile immunity. There exists a BCG-M version of the vaccine; it contains half as many microbacteria per 0.1 ml. BCG-M is administered intradermally and is used for vaccinating premature babies or individuals who did not receive the vaccine in the maternity hospital because of medical contraindications. If the BCG-M vaccination is performed on a child older than two months, it is also preceded by the Mantoux test in order to ascertain whether the child is already infected with tuberculosis.

The polio vaccine is administered internally in short courses, with "revaccination." The first course is a three-time administration at 45-day intervals; the vaccine is first given at the age of three months. Revaccination at one and a half to two years and two to three years consists in a two-time administration of the vaccine orally, at 45-day intervals. Two more revaccinations—at seven to eight years of age and 15-16 years of age—are one-time administrations of the preparations.

The adsorbed DTP (diphtheria, tetanus, pertussis) is administered intramuscularly. The first vaccination course consists of three injections at intervals of 45 days, beginning at the age of three to six months. Revaccination consists in a one-time administration, at 1.5-2 years of age. The vaccine can be administered simultaneously with the polio vaccine. Sometimes the course of primary immunization of DTP is extended because of contraindications—the vaccine cannot be administered for two, six, or even 12 months after intercurrent diseases or injuries that are expressed as allergic reactions (the amount of time the administration of the vaccine is delayed depends on the severity of the disease). After bronchial asthma or asthmatic bronchitis, DTP cannot be administered for two years. Such caution is justified by the strong adjuvant properties of the pertussis agent, which is capable of provoking exacerbation of the inflammatory or allergic process. As is known, pertussis is sometimes accompanied by neurological complications, which is why great care needs to be exercised when children who have suffered craniocerebral injury are being immunized. The reaction to DTP is basically the same as that noted for IM administration of other vaccines: locally, there is hyperemia of the skin and a small infiltrate. Overall, there is general malaise and a temperature of about 37.5°C for two days. In very rare cases, severe complications are observed: shock, convulsions, and allergic eruptions. One must keep the possibility of such complications in mind at all times, because they require rapid intervention (treatment for shock,

antihistamine preparations). If there is an unusual reaction, DTP administration is not repeated, and the course can end with the use of a DTP preparation that includes only diphtheria and tetanus anatoxins. The DTP vaccine is also used for revaccination against diphtheria and tetanus at ages six and 11 or a little older. For the next revaccination—at age 16—only the tetanus anatoxin, administered IM, is used.

Live measles vaccine is administered to children subcutaneously at age 12 months. If a pregnant woman is tested for measles antibodies and none is found, the vaccination can be done earlier, at age six months, because the child is not protected by antibodies received from the mother.

At present in the USSR, revaccination against measles at age six years is also decreed. The measles vaccine sometimes causes a measles-like illness—a "vaccine reaction." When the vaccine is used for massive numbers of individuals, elevation of temperature to 38.5°C is permissible in 4 percent of those receiving injections (as a rule, the high temperature should not remain for more than two days). Other signs of the illness are possible: conjunctivitis, cough, nasal cold, and, occasionally, small eruptions. If isolated cases of illness appear in a group of schoolchildren whose level of protection is relative (if, for example, many children were not vaccinated, because of colds), emergency vaccine prophylaxis must be performed—children must be vaccinated within two to three days after the appearance of the first illness. That will make it possible to avert an outbreak. The administration of the vaccine may result in the rapid development of a nonspecific protective reaction (release of interferon), which is then replaced by specific immunity. Of course, prophylaxis in foci is also done with gamma-globulin, but long-term specific immunity does not appear in that case.

Live parotitis vaccine is administered subcutaneously, once, at the age of 15-18 months. Clinical signs of the vaccine process are not usually observed after the vaccine's administration. A contraindication for the use of parotitis vaccine is, primarily, quarantine for measles, rubella, chicken pox, or pertussis.

Massive vaccinations—as well as individuals coming down with an illness or being exposed to it in an immune state, but not catching it—result in the blood of adults almost always containing antibodies against measles and parotitis. Gamma-globulin taken from such blood contains antibodies and can neutralize the action of live vaccines. If an infant has received parenteral gamma-globulin for any reason, then vaccination against measles or parotitis should be performed no earlier than six weeks after the last injection. Gamma-globulin cannot be administered earlier than two weeks after vaccination, i.e., the period of the vaccine process.

It is important to pay attention to the relationship in time between measles and parotitis vaccinations. Theoretically, they can be administered simultaneously, since there is a great deal of worldwide experience in the use of live attenuated trivaccines (measles, parotitis, and rubella). If a child has already received the measles vaccine, then it is recommended that one wait six months before administering the parotitis vaccine, because both may contain traces of cross-reacting proteins (albumin of quail and chicken), which is associated with the methods of their preparation. Sensitization of the body of the vaccinated child to those proteins disappears after six months.

We should mention a few vaccines that are used for children as well as adults. Inactivated cultured vaccine for tickborne encephalitis is used for multiple vaccination in epidemic regions. Children receive their first vaccination at the age of four years, with the course consisting of four vaccinations given at intervals of seven to 10 days, 14 to 20 days, and four to six months; the doses are half those given to adults. It is recommended that such courses be repeated annually (revaccinations) for three to four years; when a child reaches the age of eight, the full dose of the vaccine can be used.

For someone at risk of contracting rabies (from a bite, a scratch, or exposure to the saliva of a rabid animal or an animal suspected of being rabid), the vaccination must begin as soon as possible (the vaccine is a cultured, concentrated, purified, dry rabies vaccine). The vaccine is administered beneath the skin of the stomach on days O, 3, 7, 14, 30, and 90; if the animal who bit the individual remains healthy for 10 days, then further administration of the vaccine can be stopped. Approximately 30 minutes after the administration of the vaccine, the individual may experience a shock reaction that requires immediate treatment, which is why a patient must not be released immediately after receiving the injection. If the individual has received gamma-globulin for rabies (or if vaccination is preventive), then inactivated, dry, purified, cerebral rabies vaccine may be used instead of concentrated vaccine, and it is given in the same course.

Live, dry plague vaccine (strain EB) is administered subcutaneously, intradermally, or epicutaneously (on scarified skin) in doses of 0.5 ml, 0.1 m., and 0.15 ml. The epicutaneous method is used for revaccination (12 months after vaccination). The vaccine is diluted on the basis of the microbial body content in it and the age of the individual being vaccinated (see chart 1).

Chart 1. Dose of plague vaccine for individuals of various ages (in millions of microbial bodies)

Age	Subcutaneously	Intradermally	Epicutaneously
14-60 years	300	300	3,000 (3 billion)
10-14 years	150	150	3,000 (3 billion)
7-10 years	100	100	2,000 (2 billion)

Chart 1. Dose of plague vaccine for individuals of various ages (in millions of microbial bodies) (Continued)

Age	Subcutaneously	Intradermally	Epicutaneously
6 months to 7 years, and over 60 years	100	100	1,000 (1 billion)

Cholera vaccine exists in two forms, each of which has its own system of vaccination. The first form is a killed vaccine (El Tor strain) that is either dry or liquid. Shots are given in cholera epidemic regions (or with epidemiological indications) to children at two years of age, subcutaneously, twice, at intervals of seven to 10 days, with revaccination after six months (see chart 2).

Chart 2. Volume of killed cholera vaccine administered to children of various ages and to adults (in milliliters)

	Dry vaccine, diluted		Liquid vaccine	
Age, in years	1st vaccination	2nd vaccination	1st vaccination	2nd vaccination
15 or older	0.5	0.5	0.5	0.75
10-14	0.4	0.4	Not administered to children under 15!	Not administered to children under 15!
5-9	0.3	0.3	—	—
2-4	0.15	0.15	—	—

Local reactions to the administration of the vaccine—hyperemia, edema, infiltrate—remain for as long as five days and are occasionally severe, to the point of lymphangitis or lymphadenitis. The overall reaction usually lasts for up to 48 hours; occasionally (0.03 percent of cases), right after injection, syncope requiring immediate intervention occurs.

The second form of the cholera vaccine is a combined form: cholerogen-anatoxin + O-antigen, dry or liquid. The vaccine is designed for preventive vaccination and revaccination (no sooner than three months after vaccination). For children 14 or under, the vaccine can be used no sooner than two months after shots of any other vaccine have been given; administration is subcutaneous, under the shoulder blade (see chart 3).

Chart 3. Volume of combined cholera vaccine administered to children of various ages and to adults (in milliliters)

Age, in years	Vaccination dose	Revaccination dose
18 or older	0.5	0.5
15-17	0.3	0.5
11-14	0.2	0.4
7-10	0.1	0.2

Contraindications for the use of the various vaccines are essentially the same. They can be separated into the following categories:

1. Acute infection or acute noninfectious illness or exacerbation of chronic infection, including tuberculosis intoxication. No vaccines can be used earlier than 30 days (sometimes 14) after recovery from influenza, angina, or acute respiratory viral infection.

2. Allergic illnesses or states, primarily bronchial asthma; the interval between its exacerbation and the vaccination must be six to eight months. With mild allergic illnesses, it is recommended that vaccination be done against the backdrop of antihistamine preparations (seven to 10 days).

3. Diseases of the CNS—encephalitis, encephalopathy, convulsive syndrome; such a disease in anamnesis is, in particular, a contraindication for the use of DTP vaccine.

4. Chronic diseases of the parenchymatous organs—the kidneys and liver. In those cases, vaccination is done at the discretion of the physician.

5. Severe diseases of the cardiovascular system, including hypertension of second and third degrees (they are particular contraindications for use of the cholera vaccine).

6. Immunodeficient states. When there are functional immune deficiencies, vaccination is done several months after recovery, at the discretion of the physician.

7. An absolute contraindication for vaccination is malignant neoplasm.

At present, more than 40 vaccines in all are used in the USSR, and some of them are special-purpose therapeutics. They are grouped below according to the nature of the preparations, the nature of the disease agent, and the features of the disease (for example, vaccines against diseases with a high lethality—plague, cholera, smallpox, yellow fever, and rabies—are singled out. They are highly reactive.).

Anatoxins

1. Diphtheria-tetanus adsorbed (DT-anatoxin)

2. Diphtheria-tetanus, sorbed with lower antigen content (M-anatoxin)

3. Diphtheria, purified, adsorbed, with lower antigen content (D-M-anatoxin)

4. Tetanus, purified, adsorbed, liquid (T-anatoxin)

5. Sextaanatoxin, purified, adsorbed (liquid or dry), for prevention of botulism, tetanus, gas gangrene.

6. Pentaanatoxin, purified, sorbed (prevention of botulism and tetanus).

7. Trianatoxin, purified, adsorbed (prevention of botulism A, B, E)

Antibacterial vaccines (anthroponoses and purulent infections)

1. Adsorbed pertussis-diphtheria-tetanus (DTP vaccine).

2. Staphylococcus, inactivated (for vaccine therapy).

3. Staphylococcus, therapeutic, liquid (staphylococcal antiphage).

4. Allergen *Staphylococcus aureus* for diagnosis and specific hyposensitizing therapy.

5. Meningococcus group A, polysaccharide, dry.

6. Gonococcus inactivated. Designed for therapy.

7. Protein, from antigens, dry. Designed for therapy.

8. BCG for prevention of tuberculosis in children.

9. BCG-M for prevention of tuberculosis in weakened children.

10. Typhoid, sorbed.

11. Typhoid, alcohol, enriched with Vi-antigen/

Vaccines against agents of zoonosis and rickettsiosis

1. Anthrax, live, dry.

2. Tularemia, live, dry.

3. Leptospirosis, inactivated, liquid.

4. Brucellosis, live, dry.

5. Brucellosis, therapeutic, liquid.

6. Q fever, live, dry, epicutaneous.

7. Vaccine E, typhus, combined, live, dry.

8. Typhus, chemical, dry.

Vaccines against especially dangerous infections and rabies

1. Plague, live, dry (strain EB)

2. Cholera (El Tor), killed, dry or liquid.

3. Cholera (cholerogen-anatoxin+O-antigen), dry or liquid.

4. Smallpox vaccine, live, dry.

5. Yellow fever vaccine, live, dry.

6. Rabies, cerebral, purified, inactivated, dry.

7. Rabies, cultured, purified, concentrated, inactivated.

Influenza and other viral vaccines

1. Flu vaccine, intranasal, dry.

2. Flu, chemical, adsorbed, killed, liquid.

3. Flu, inactivated, liquid, centrifuged.

4. Flu, chromatographic, inactivated, liquid.

5. Flu, chromatographic, inactivated, liquid, for children (Type A).

6. Measles, cultured, live, dry.

7. Parotitis, cultured, live, dry.

8. Poliomyelitis, peroral, types I, II, and III.

9. Tickborne encephalitis, cultured, inactivated, sorbed.

10. Herpes, cultured, liquid (for therapy).

11. Acute encephalomyelitis and multiple sclerosis (therapeutic).

Moreover, being prepared for approval and use are a meningococcal, polysaccharide A+C vaccine; an aerosol vaccine for intranasal use (against certain widespread agents of infections of the upper respiratory tract); a vaccine against pyrocyanic infection; a vaccine for measles and parotitis, and a vaccine for measles, parotitis, and rubella. Here we purposely left out vaccines of a new type—genetically engineered vaccines containing various adjuvants; wholly synthetic vaccines. None of them has been introduced into practice. Special survey and experimental articles have been devoted to those preparations, vaccines of the future. The aim of this article has been to survey and systematize vaccines that are in the armamentarium of the practicing physician.

Natural Foci of Tick-Borne Encephalitis in the Southwestern Coast of Sakhalin

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[Article by N. M. Pukhovskaya, A. M. Dolgikh, L. A. Vereta, and A. G. Pletnev; Khabarov Scientific Research Institute [NII) of Epidemiology and Microbiology of the Ministry of Health (Minzdrav) of the Russian Soviet Federated Socialist Republics (RSFSR and Novosibirsk) Institute of Bioorganic Chemistry of the Siberian Division, USSR Academy of Sciences (SO AN SSSR)]

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[Text] Cases of individuals suffering from tick-borne encephalitis (TBE) on Sakhalin Island have been recorded since 1958 [10]; however, the features of the natural foci of this infection on the island have been insufficiently studied up until the present time.

According to the schema of regionalization of the areal of the causative agent of TBE, the territory of the island has been distinguished as a separate Sakhalin focal region of the Pacific Ocean Coast group of focal regions with low-intensity manifestation of the infection [4, 5]. The existence here of natural foci of TBE, found within the limits of the areal of the Taiga tick *Ixodes persulcatus*, has been proven by the presence of an immune band

among people and animals [7, 8, 13, 14], and by the isolation of the TBE virus from ticks [6]. Information regarding specific cases of the disease in humans [7, 10, 12], including cases with lethal outcome [11], confined to the western coast of the island, has been published.

The present study reflects the results of a zoological-parasitological and virological study of a natural focus of TBE along the southwest coast of Sakhalin Island. Field observations and the collection of ticks for virological investigations were carried out on the site of the Kalinino fish processing plant (the Kalinino settlement of the Kholmskiy region of Sakhalin Oblast). According to the schema of the geobotanical regionalization of Sakhalin [15], this territory belongs to a subzone of dark coniferous forests with an admixture of platyphyllous genera.

The data presented in the article were obtained in the 1987-1989 epidemic seasons (with the addition of the results of the investigations of 1975-1979).

The abundance of ticks was determined on the basis of their number on a standard flannel flag during a one-hour count (flag-hour), and in some instances, on a per 1 m^2 basis (counts on clearings in bamboo stands). In all, for the years of the investigations 82 flag-hours were analyzed, and 8,500 imago of the ixodic ticks were caught and identified.

The presence of the viruses in the ticks were determined by the bioprobe method (using pools of 10 males or females each) in mongrel white mice, weighing 6-8 g, by the generally accepted schema of the plating and typing of the isolated neurotropic agents. In all, 102 pools were studied; one neurotropic agent was isolated and typed as a strain of the TBE virus. In order to detect and determine the amount of viral RNA in the pools and in individual ticks (896 specimens were investigated), the nucleic acid molecular hybridization method (NAMH) was utilized [2].

As in the observations demonstrated, the peak of activity for ticks in the region under study falls within the middle of June, which is in agreement with the investigations of other authors [1, 14].

The fauna of the ixodic ticks in the region under study was represented by three species: 1) *Ixodes angustus* (this was encountered only in collections of the ectoparasites from small mammals); 2) *Hemaphysalis concinna* (one female was taken from vegetation in a river valley on the coast of the Tatar Strait at the settlement of Kalinino, on June 14, 1987); and 3) *I. persulcatus*, which inhabits the territory under examination practically ubiquitously, from meadow associations close to the settlement up the peaks of the watershed ranges (Table 1). Areas of closed, littered dark coniferous forests in which the ticks were encountered only episodically constitute the only exception. The number of ticks was minimal, up to five to nine specimens per flag-hour, in the stands of Kurile bamboo on the southern slopes of the cone-shaped hills. However, here in sections which were very small in area (20 m^2), and which were free from bamboo (individual clumps of leafy trees, the sites of transplantations of nursery plants during forest restoration operations, microscree on slopes, and others), the abundance of ticks was greater (up to 5-30 imago per 1 m^2); they were observed in increased numbers on the tracks in the bamboo stands. On the bare peaks of the watershed crests in the first half of June 1987, the abundance of the imago of *I. persulcatus* was 1.0-1.3 per man-hour. The highest population of ticks annually was observed in a clearing in a coniferous-leafed forest and at the boundary of the tall herbaceous vegetation and gardens behind the settlement.

Table 1. Abundance of Taiga Ticks (Imago per Flag-Hour) in Various Terrains in the Period of Maximal Activity

Terrain	1987	1988	1989
	Dark coniferous littered forest	00	0.4
Dark coniferous fern-grass forest	-	-	24
Coniferous-leafed grass forest	106	-	24
Stands of tall grass and bamboo in an opening in a coniferous-leafed forest	275	316	318
Tall grass in a clearing of a coniferous-leafed forest	105	-	-
Coniferous-leafed forest along the bank of a mountain stream	140	-	-
Mixed leafy forest along the crest of a cone-shaped hill	-	-	64
Leafy forest with grasses and bamboo	176	-	104
Stands of bamboo on southern slopes	6	9	5
Cereals and grasses along river valleys	166	144	156
Cereal-grassy meadow on the settlement margin	132	-	88
Boundary of tall grasses and gardens at the foot of cone-shaped hill	174	258	205
Cereal forbs in the gulley of a stream on the coast of Tatar Strait	136	-	33

Note: 0 indicates no ticks found; dash, counts not done.

In 1987 a neurotropic agent was isolated from a pool of ticks collected in the clearing in a coniferous-leafed forest, and was typed as a strain of TBE in HAI [hemagglutination inhibition] test with a type-specific serum to the reference "Sofin" strain, in the biological neutralization reaction with immunoglobulin against TBE from the blood of donors (IN = 4.7 lg $L.D._{50/ml}$), and in a modification of the NAMH method. The values of the activity of the strain when injected intracerebrally were 8.95 lg L.D. 50/ml; in the case of subcutaneous injection, 6.7 lg $L.D._{50/ml}$; the invasiveness index was 2.25 lg $L.D._{50/ml}$. It was not possible to isolate the virus in 1988. The indication of the RNA of the TBE virus which was carried out concurrently with the bioprobe by the NAMH method revealed the presence of the virus over the entire territory of the focus studied. The detection and the determination of the amount of viral RNA in individual *I. persalcutus* ticks collected in various sites of habitation (Table 2) were carried out in order to characterize the distribution of the TBE virus and the natural focus in greater detail. Viral RNA was found in 1987-1988 in 17.7-18.5 percent of ticks collected in a clearing of the coniferous-leafy forest. Imago with the viral RNA of TBE in amounts of 100 pg and above were identified more frequently. The lowest level of infectedness was observed in ticks collected from vegetation in the river valleys and in large stands which were most remote from the large tract of the coniferous-leafy forest. The degree of infection of male and female ticks was identical on the whole throughout the focus with some differences within specific terrains.

Table 2. Presence of RNA of the TBE Virus in Individual *I. persulcatus* Ticks

Site of collection of ticks	Females				Males				Total			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
1987												
Stands of tall grass and bamboo in an opening in a coniferous-leafed forest	73	8	2	10	84	13	6	19	157	21	8	29
				13.7+/-4.0				22.6+/4.6				18.5+/3.1
Coniferous-leafed forest along the bank of a mountain stream	48	9	1	10	33	4	0	4	81	13	1	14
				20.8+/5.9				12.1+/5.7				17.3+/4.2
Cereal forbs in the gulley of a stream on the coast of Tatar Strait	50	8	1	9	48	3	2	5	98	11	3	14
				18.0+/5.4				10.4+/4.4				14.3+/3.5
Forest meadows among bamboo stands	48	4	1	5	49	8	0	8	97	12	1	13
				10.4+/4.4				16.3+/5.3				13.4+/3.5
Cereals and grasses along river valleys	32	2	0	2	60	5	0	6	90	7	0	7
				6.7+/3.4				8.3+/3.6				7.8+/2.8
Larch forests with forbs and bamboo	41	2	0	2	44	1	0	1	85	3	0	3
				4.9+/3.4				2.3+/2.3				3.5+/2.0
Total... abs.	290	33	5	38	318	34	8	42	608	67	13	80

Table 2. Presence of RNA of the TBE Virus in Individual *I. persulcatus* Ticks (Continued)

Site of collection of ticks	Females				Males				Total			
%				13.1+/-2.0				13.2+/-1.9				13.2+/-1.4
1988												
Stands of tall grass and bamboo in an opening in a coniferous-leafed forest	48	8	1	9	48	7	1	8	96	15	2	17
				18.5+/-5.6				16.7+/-5.4				17.7+/-3.9
Forest meadows among bamboo stands	48	5	0	5	48	9	0	9	96	14	0	14
				10.4+/-4.4				18.8+/-5.6				14.6+/-3.6
Cereals and grasses along river valleys	48	4	0	4	48	3	0	3	86	7	0	7
				8.3+/-2.8				6.3+/-3.5				7.3+/-2.7
Total... abs.	144	17	1	18	144	19	1	20	288	36	2	88
%				12.5+/-2.8				13.9+/-2.9				13.2+/-2.0

Note: I, ticks examined; II and III, number of ticks containing the RNA of the TBE virus, 10 pg and ≥100 pg, respectively; IV, total number of ticks containing ≥10 pg.

The use of the NAMH method for the study of the infection with the TBE virus of particular ticks in combination with the zoological-parasitological investigations makes it possible to carry out an assessment of the potential danger of specific areas of a natural focus.

The results obtained indicated wide dissemination of the TBE virus (viral RNA) throughout the territory of the natural focus; its presence was observed in all of the sites of habitation of the ticks investigated. At the same time, the most active portion of the focus (nucleus) [5] should be considered the section of coniferous-leafy forest at the fish-processing factory settlement on a slope with northern exposure. The higher population of the *I. persulcatus* imago, the isolation of a strain of the TBE virus from ticks trapped here, their highest degree of infectedness (as determined by the NAMH method), and the significant proportion of ticks containing 100 or more pg of the RNA of the TBE virus.

The population and degree of infection of the ticks in the natural TBE focus under study along the southwestern coast of Sakhalin Island are high and comparable with those in the continental portion of the Far East [9]. The specific characteristics of the Sakhalin strains of the TBE virus are possibly one of the reasons for the rare recording of clinically expressed forms of TBE [3]. Overall, the question of the assessment of the degree of epidemic danger of the natural focus is extremely complicated, and is determined by a substantial number of factors, both natural and social. The results examined in the present report reflect only the main characteristics of the natural focus which permit the delineation of the most dangerous areas of the territory with respect to TBE.

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Approaches to the Molecular Epidemiology of Rickettsiosis

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[Text] The group of human rickettsiosis illnesses that are caused by intracellular obligate bacterial parasites—rickettsiae—that differ in their ecology and biology includes illnesses that vary in terms of epidemiology and geographical distribution: epidemic typhus, Brill-Zinsser disease, endemic murine typhus, Rocky Mountain spotted fever (RMSF), scrub typhus of Central Asia, Mediterranean spotted fever (MSF), tickborn Australian typhus, poxlike rickettsiosis, tsutsugamushi, and Q fever. It should be emphasized that rickettsioses are spread throughout the world and no one knows precisely the boundaries of their distribution.

Global experience in the observation of the epidemic situation indicates that the importance of human rickettsiosis illnesses may vary widely, manifesting themselves in the form of outbreaks, sporadic morbidity, or epidemics, as in the case of epidemic typhus.

Typical at this time is something noted since the 1970s—activation of the manifestation in the infectious pathology of man of a number of epidemic rickettsioses. In the United States, the morbidity has grown for tickborne RMSF,[47] which is the principal serious rickettsiosis for that region, with a 5 percent lethality rate. But it needs to be noted that since 1984, morbidity due to RMSF has dropped some.[10]

At the same time that morbidity due to RMSF has been on the rise in the United States, morbidity due to MSF has grown from sporadic morbidity to hundreds of cases a year in Italy, France, Spain, and Portugal.[18,22,33,40] No tendency indicating a drop in MSF morbidity has been noted. A specific feature of today's MSF is a worsening of the clinical manifestation of the disease, ending in death in 1-5 percent of cases, as well as the fact that a number of the affected individuals do not show the primary affect typical for that disease.[25,45]

A new type of illness from among the group of tickborne RMSFs has been identified in Israel. That illness is characterized by the absence of primary affect and the presence in a number of cases of recidivists, and in terms of the severity of clinical symptomatology, it occupies a position between RMSF and MSF.[11-15,19,32,34,48] Study of the antigen specificity of rickettsial strains isolated in Israel from patients or from ticks via the fluorescence antibody method combined with adsorption of immune sera of homologous and heterologous dissolved antigens of rickettsiae showed that the strains are identical to each other, but differ from the rickettsiae of the tickborne RMSF group. To a lesser extent, the Israel strains differed from *Rickettsia sibirica,* and even less from *R. conorii* isolated in India and rickettsiae of the same species isolated in Morocco. They also differed from *R. akari.* Most of all, they differed from *R. rickettsii* and *R. australis.* The antigen heterogeneity of the strains of *R. conorii* indicated in those studies should be emphasized.

Illnesses from the group of tickborne RMSF have unexpectedly been found in Japan.[43]

Along with that, it should also be noted that activation of the manifestation of endemic rickettsiosis foci of the group of tickborne RMSF does not appear everywhere. For example, no activation of foci of MSF has been observed in the Crimea.[6]

It was roughly in the 1970s that tsutsugamushi morbidity began to be recorded anew in Japan, but with different locations of the foci.[36,38]

There are recent reports of a large number of cases of Q fever, with chronic hepatitis and endocarditis, with, in a number of cases, a fatal outcome and ineffectual tetracyline treatment.[8,16,17,30] The current screening of the sensitivity of strains of *Coxiella burnetii* to tetracyline has revealed in a number of strains lower sensitivity to that antibiotic.[35]

Activation of the manifestation of endemic rickettsioses from the group of tickborne RMSF and tsutsugamushi correlates with the growth of anthropogenic effects on nature. However, that alone cannot explain the observed phenomenon, particularly the worsening of the clinical course of tickborne MSF or the presence in known endemic zones (Sicily) of illnesses that are clinically and serologically similar to MSF, but do not have its characteristic primary affect. Not completely clear are what is leading to a diminution of the manifestation of endemic foci of tickborne rickettsioses. Unexplained is the well-known rapid drop in morbidity due to fatal tickborne RMSF in western Montana in the United States without any apparent human intervention, in a period without antibiotics.[20]

The available data raises many questions that require answers in order to accurately assess the status of the endemic rickettsioses. As is known, typical of the agents of endemic rickettsioses is a pronounced variability of virulent and antigen properties that apparently reflect a plasticity of properties among those rickettsioses. The strain variation, in terms of virulence, that correlates with the geographic zone of distribution of disease and the different type of foci—from malignant to benign—are typical of rickettsioses of the group of tickborne RMSF. A specific feature of the agents of endemic rickettsioses is also the simultaneous circulation in a limited territory of strains that are variable in terms of their properties, and a large number of apathogenic

strains of the antigen complex of tickborne RMSF have been found.[7,20,23,24,46] As for *R. tsutsugamushi,* data are available on the heterogeneity of the circulating population in the vector.[9] The complex of those data makes it possible to assume a genetic variability of rickettsiae,[20] as well as changes in the composition of circulating population of agents.

In terms of answering those questions, traditional serological and biological methods of study of rickettsiosis agents are inadequate. A new approach is needed in the study of the agent, as is the development of new instruments for epidemiological analysis, which is possible because of achievements made in the study of the protein composition and genome of rickettsiae and coxiellae.

A structural analysis of the chromosomal DNA of rickettsiae by means of restriction endonucleases in combination with DNA probes has turned out to be suitable for molecular-genetic differentiation of rickettsiae.[26,27] In the cited studies, as well as in ours,[3] it was shown that different species of rickettsiae (*R. prowazekii, R. typhi, R. rickettsii, R. sibirica,* and *R. conorii*) have clearly different restrictograms. Other studies demonstrated the suitability of the method for intraspecies differentiation of rickettsiae. Using the method, R. L. Regnery et al.[29,42] demonstrated the similarity of virulent strains of *R. rickettsii* isolated in the United States, as well as their difference from virulent strains of that same species isolated in Costa Rica and their difference from a strain of *R. rickettsii* isolated from ticks of *Haemaphysalis leporispalustris,* which has a lower virulence. The method was also used to demonstrate the presence of circulation of different strains of rickettsiae of the group of tickborne RMSF in western Sicily. A number of strains isolated from people with clinically pronounced MSF confirmed serologically and from ticks of *rhipicephalus sanguineus* did not differ from a reference strain of *R. conorii,* and other strains were similar to the *R. sibirica* strain of Thai tick isolated in Taiwan and to the strain isolated in Israel. The data obtained indicate the effectiveness of the method for molecular-genetic differentiation of rickettsiae of the group RMSF. But it should be noted that genetic differentiation of pathogenic and apathogenic rickettsiae ciruclating in ticks needs to be developed.[7,23,46]

The genetic heterogeneity of the rickettsial strains of tickborn RMSF circulating in Sicily was confirmed by the results of a study of their protein composition via polyacrylamide gel electrophoresis (PAGE). The study showed the similarity of a number of strains to *R. conorii,* as well as the similarity of others to *R. sibirica, R. rickettsii,* and the Thai tick strain.

PAGE analysis of proteins and immunoblotting demonstrated differences between the strains of *R. tsutsugamushi* newly isolated from tsutsugamushi patients in Japan and the classical strains of *R. tsutsugamushi* that were isolated earlier.[37,39]

The technique of restriction analysis of DNA, combined with a DNA probe, was effective for differentiating strains of *R. prowazekii* that could not be differentiated with serological methods. R. L. Regnery et al.,[28] using that technique, showed that the restrictograms of strains of *R. prowazekii* isolated from certain flying squirrels in the United States—strains very similar to *R. prowazekii* isolated from epidemic typhus patients—differed in that they had an additional fragment upon restriction via BamHI endonuclease. When that fragment was used as a DNA probe, differences were demonstrated in the regions of its hybridization with the DNA of the strains from the flying squirrels and the classical strains of *R. prowazekii.*

The restriction analysis done in our research [3,4] of six strains of *R. prowazekii* that were isolated in various forms of epidemic typhus in various regions and that differed in virulence showed that the DNA restriction maps of some of the strains, with the use of the restrictases Cfr131, HindIII, MspI, MvaI, BamHI, EcoRI, PstI, and XhoI and with a great homology for one and the same enzyme, had reproducible differences in terms of one to two fragments in the range of 8-20 tbp. Coinciding restrictograms had DNA of the strains of Breinl and G (isolated from patients with epidemic typhus in Poland and parts of the USSR near it) and the strain of Ananyev (isolated from a patient with Brill-Zinsser disease in the same area as that with strain G). Those strains—unlike the barely pathogenic strain E (which is an attenuated mutant of the virulent strain Madrid I, which was isolated in Spain), the virulent strain EVir (produced with the intranasal passage of strain E,[12]) and the strain Katsinyan (isolated from a patient with epidemic typhus in Armenia)—have an additional fragment when restricted by Cfr131, HindIII, MspI, and MvaI.

The strains E, EVir, and Katsinyan have the same restrictograms, and have even more fragments than the above strains when restricted by BamHI, EcoRI, MspI, PstI, and XhoI.

The similarities and differences identified in the studied strains on the basis of the distribution of DNA fragments associated with endonuclease restriction do not correlate with the form of epidemic typhus in which the strain is isolated, with region of isolation, or with virulence of strain. What is noteworthy is the similarity of strains isolated in Armenia and Spain—regions of the same geographic latitude.

Based on the restriction analysis of chromosomal DNA of *R. prowazekii,* the strains thus far studied by R. L. Regnery et al.[28] and by us[3] may be separated into three groups: a) strains that coincide with the standard virulent Breinl strain, b) strains that coincide with the isogenic pair of barely pathogenic strain E and its virulent revertant strain EVir, and c) strains that are isolated from the flying squirrels.[28] It's important to note that the differences we identified via restriction analysis of DNA between the Breinl strain and the isogenic pair of strains

E and EVir correlated with the differences we found between those strains in terms of the electrophoretic distribution of proteins in PAGE.[15] Studies have examined two independent isogenic pairs of the barely pathogenic strain E and its virulent revertant strain EVir, which differed in terms of the passage history and biological characteristics of the initial strain E.[1] One series of strain E (No 281) represented a passage series of strain E received from the United States in 1955 and differed from the other series of strain E in its considerably lower residual virulence for guinea pigs and white mice. The other series of strain E (No 20) was received from the United States in 1969 and had characteristics typical of all other series of barely pathogenic strain E. In both pairs of strain E and Evir and the Breinl strain, as many as 55 polypeptides were identified, and among them six proteins with molecular weights of 130, 60, 32, 30, 25, 17 kilodaltons were major. The distribution of the protein components of the studied strains coincided, with the exception of differences in position IV of the protein, which in the Breinl strain revealed a lesser electrophoretic mobility than in the two independent isogenic pairs of E and EVir. The coincidence of electrophoretic mobility of protein components in the two independent genetically linked parts of E and EVir indicates that their position reflects strain characteristics. For a final solution of the problem of the importance of differences in electrophoretic mobility of the IV protein, comparative studies are needed between strain E and the initial parent virulent strain for it, Madrid I, and a large set of different strains of *R. prowazekii.*

Great progress has been achieved in the identification of various strains of *C. burnetii* on the basis of restriction analysis of plasmid DNA, as well as chromosomal DNA combined with DNA probes.[21,31,44]

Analysis of strains of *C. burnetii* has identified differences in size and structure of plasmid DNA that correlated with form of disease and source of isolation of the strains of agent.[31] The studied strains differed in terms of the remoteness of the region of their isolation (Italy, Canada, United States, Turkey, and Egypt), time of isolation, duration of passage in laboratory conditions, and source of isolation (ticks, cows, and patients with acute Q fever or chronic Q endocarditis or hepatitis). In a screening of 14 strains of *C. burnetii* via autoradiography of total DNA restricted with EcoRI endonuclease and hybridized with labelled DNA of the QpHI plasmid, the isolates were separated into three groups. A marked similarity of autoradiography pictures was noted in isolates taken from people with acute Q fever, from the milk of cows, and from ticks and one strain isolated from a goat. Another group of strains that had identical autoradiograms but whose autoradiograms differed from those of the above strains consisted of isolates from goats and a number of strains isolated from patients with Q endocarditis. From one of the strains of that group (strain Q 177, isolated from a goat), a plasmid designated as QpRS was isolated. The plasmid QpRS exceeded the plasmid QpHI by 2-3 kb, and in the restriction maps of the DNA of each plasmid, unique nucleotide sequences were identified. The use of the QpRS plasmid DNA in the autoradiography confirmed the observed differences in the application of the QpHI plasmid DNA. A third type of autoradiography was seen in three strains isolated from Q-endocarditis patients. A plasmid could be isolated form those strains, which could, the authors presume, indicate that the plasmid is built into the chromosome or that nucleases splitting the plasmid are present in the process of isolation.

The differences or similarities of strains of coxiellae in terms of plasmid DNA are in agreement with data of studies that used restriction analysis of their chromosomal DNA.[21,44] Data obtained on the molecular genetics of *C. burnetii* are in agreement with clinical-epidemiological observations of benignness and malignancy of various types of natural foci of Q-rickettsiosis (cows, sheep, goats) and discrimination into a special nosological form of chronic, often fatal, Q endocarditis and hepatitis.

Thus, the study of the agents of rickettsiosis is producing the development of the technology for the identification of the agents via molecular biology. Analysis of protein antigens of rickettsiae—via protein chemistry and immunoblotting—and restriction analysis of the rickettsial chromosomal DNA and plasmid and chromosomal DNA of coxiellae combined with DNA probes have produced data detailing the characteristics of strains of rickettsiae of various species isolated before and recently in various regions of the world, as well as strains of coxiellae. Those data adjust the established notions about those agents and the range of their distribution. The area examined is an intensively developing area in rickettsiology. In terms of epidemiological analysis, promise is held by genetic differentiation of strains of rickettsiae on the basis of restriction analysis of chromosomal DNA in combination with molecular DNA probing; promise is held in differentiation of coxiellae based on plasmid DNA. Clear and specific restrictograms of genetic material of rickettsiae and coxiellae can serve to identify species and, apparently, strains of agents of rickettsiosis, which is important also for the taxonomy of rickettsiae. Based on that, it is necessary to classify the existing typical and atypical strains of various species of rickettsiae according to chromosomal DNA restrictograms, and the various strains of coxiellae according to restrictograms of plasmid DNA.

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Response of the Sympathoadrenomedullar System of Young Rats of Various Ages to Subcutaneous Administration of a Cardiotoxic Dose of Noradrenaline

927C0110C Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 100 No 1, Jan 91 (manuscript received 12 Dec 89) pp 9-14

[Article by R. A. Serov and N. N. Sokolova, Department of Pathological Anatomy, Treatment Faculty, Second Moscow Medical Institute imeni N. I. Pirogov]

UDC
611.839.21:577.175.52:615.015.217.2.032.73:57.08
+612.017.2

[Abstract] The sympathoadrenal system, triggered by stress, plays a substantial role in adaptation to extreme factors. In studying sympathoadrenal system response to stress as a function of the system's development, the researchers here focused on the sympathetic nerves of the heart, which are organs with well-developed sympathetic innervation, and the adrenal gland cortical matter of young rats 1.3 weeks and 1.5 months old. Those ages are critcal in the process of maturation and the formation of sympathetic innervation of the whole body as well as the heart. Noradrenaline was injected subcutaneously in the rats to produce hypercatecholaminemia. Quantitative histofluorescence studies demonstrated that by the third week of growth, the degree of development of the cortical matter is high and is near that of a mature animal. The density of the distribution of adrenergic terminals in the myocardium at three weeks of age is, however, considerably less than in an adult animal and remains as such even when sexual maturity is reached. Rats one and three weeks old are not sensitive to a toxic dose of noradrenaline; at 1.5 months, they are highly sensitive. The body's response to stress depends in no small measure on the degree of development and differentiation of its sympathoadrenal system. References 11: 8 Russian, 3 Western.

Objectives of the Health-Epidemiological Service of the Republic for 1991-1995

927C0137 Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 91 pp 1-5

[Article by A. A. Amanbayev, KaSSR Ministry of Health]

UDC 614+614.7(574.1)

[Text] At present, our entire society, including the health care for our society, is going through a difficult period. Economic ties between regions and individual enterprises have been disrupted, the system of material-technical supply is in disarray, and serious difficulties are being experienced in providing the populations with consumer goods and foodstuffs.

The crisis that has come about in the country is preparing the ground for a worsening of the health-epidemiological conditions. Consequently, the role of the health-epidemiological service is growing severalfold as the main component for alleviating the adverse effects of environmental factors on the public health.

Analysis of the situation indicates that work in that area is already being done and has resulted in certain positive changes. As a result of the measures that have been taken, a reduction has been achieved in number of infectious diseases. For example, morbidity associated with typhoid has diminished almost 3-fold, and for the first time, the intensive indicator for that has been comparable with the all-Union figure. The activity of the health-epidemiological service here is geared to a detailed analysis of the sources of morbidity, to a singling out of unfavorable microsectors, and, consequently, to scrupulous preventive work.

A steady decline continues in acute intestinal infections, the level of which has remained below the Union average since 1985: the figure went from 531.6 per 100,000 population in 1987 to 412.7/100,000 in 1990, to include bacterial dysentery (which went to 106.8/100,000 from 180.9).

Experience shows that thanks to constant tracking of the health-epidemiological background, to the rapid response to deviations in the health-epidemiological well-being, and to decisive measures, we were able to have a real effect on morbidity. The health-epidemiological service is known to have devoted a great deal of attention to change in the situation with brucellosis. Success was achieved there through the joint efforts of science and applied fields and as a result of the broad enlistment of all interested agencies. The path to success was marked by the introduction of new methodological approaches in the system of epidemiological inspection for the purpose of finding sources of infection and neutralizing them. New diagnostic media proposed by Kazakh scientists were tested and approved. In seven of the most unfavorable oblasts, a new chemical brucellosis vaccine underwent testing. All that had a decisive effect on the epidemiological situation and morbidity, which has declined since 1985 (going from 14.9 in 1986 to 11.2 in 1990).

Unfortunately, that figure remains high in some oblasts: Dzhambul (34.4), Chimkent (23.4), Alma-Ata (20.1), and Taldy-Kurgan (15.1). Because of that, the KaSSR Ministry of Health Scientific Research Institute of Epidemiology and the Central Asia Antiplague Institute have received specific charges to develop efficient, organizational-epidemiological approaches to the solution of the medical problems associated with brucellosis.

As a result of the disciplined joint activity of the health-epidemiological, pediatric, and internal-medicine services, some success has been achieved in the struggle against pediatric infections via controlled means of specific prophylaxis. Every year, nearly 6 million vaccinations are given, and the system for constant monitoring of the level of immunity to diphtheria, measles, and polio is in operation. Steps have been taken to create a "cold network," and the write-off of bacterial preparations has been brought down to a minimum. In the final analysis, over the 12th five-year plan, we managed to reduce morbidity due to measles to virtually a handful of cases (there were 8,966 cases in 1986 and 273 in 1990); morbidity due to diphtheria remained at a level of 0.2/100,000 population. There was a positive shift in the morbidity associated with epidemic paratitis, and the figures for whooping cough were a third of the Union average.

Showing steady improvement were a number of health-epidemiological parameters. The quality of tap water improved, and the percentage of samples not meeting the GOST standard for bacteria dropped to 6.5 percent from 9.3 percent. As a result of fewer releases of polluted water into reservoirs, bacterial contamination of the reservoirs dropped to 18.0 percent from 23.2 percent, and chemical pollution of the reservoirs dropped to 13 percent from 17.5 percent. The air in a number of cities improved: the volume of releases of pollutants for the republic as a whole dropped by 307,000 cubic meters, or 6 percent.

The republic Ministry of Health has strengthened staff levels of radiological groups and has improved their supply of radiometric and dosimetric gear. The republic Health-Epidemiological Service has set up a center for individual dosimetry that serves all regions, and it has introduced new rapid-analysis techniques, which has increased the number of laboratory tests performed by 2.5-fold. The radiation situation has been taken under special control.

Agencies of the state health inspectorate have taken a number of dramatic measures to regulate the use of pesticides and mineral fertilizers. The use of nearly 70 of the most highly toxic preparations has been banned, and the use of 30 others has been restricted. Thus, a 35 percent reduction has been achieved in the amount of pesticide used on farmlands, and, in turn, pesticide contamination of food products has diminished 5-fold

and nitrate contamination, more than 2-fold. "Clean" fields (pesticide-free) have been earmarked for providing the sources of children's, dietary, and medicinal food.

However, occasions of self-attenuation are still few, and the health-epidemiological service must resolve the mass of problems that has accumulated. In spite of the fact that morbidity associated with typhoid has subsided dramatically in the republic as a whole, it remains high in certain oblasts—namely Kzyl-Orda, Chimkent, and Semipalatinsk oblasts. The same is true for acute intestinal infections. Morbidity due to such infections was 611.3 per 100,000 population in Chimkent Oblast last year, 556.7 in Pavlodar Oblast, 525.4 in Guryev Oblast, and 419.4 in Semipalatinsk Oblast—all of which are considerably higher than the republic average.

In recent years, the epidemiological situation with regard to salmonellosis has worsened considerably in the republic. The reason for that is the critical situation that has come about at poultry plants. As a result, this year careful laboratory testing of all subunits must be done, facilities contaminated with salmonella must be identified, the extent of contamination must be ascertained, measures for making the poultry healthy must be developed in cooperation with the veterinary service, and adherence to the measures must be set up. At the same time, monitoring of the adherence to health regulations must be strengthened in public catering enterprises that use poultry, eggs, and powdered eggs.

Another enormous problem associated with infectious pathology in the republic is viral hepatitis. The level of morbidity was 478.0/100,000 population in 1990, exceeding the Union average for 1989 by 1.5-fold. Serious concern is evoked when that infection strikes children. Among those who have had viral hepatitis, 70-90 percent are children. The fact that enteroviruses have been found everywhere in a number of oblasts and that the antigen for hepatitis A virus has been identified in drinking water calls for strict monitoring of the sanitary conditions of the water supply and places on the agenda issues related to accelerated construction of water mains and provision of the population with a centralized water supply.

Nor are the problems with morbidity associated with hepatitis B diminishing, and its level at present is 31.6/100,000 population. But hepatitis B is just one of the nosological forms of the group of "hospital" infections whose activity is steadily growing. In order to prevent those infections, health-epidemiological stations have created groups of hospital hygiene; and in large treatment-prevention facilities, job slots for epidemiologists have been introduced, nomenclature and the volume of laboratory tests have been increased, and a statistical log is being introduced for intrahospital illnesses and complications. Bacteriological monitoring encompasses all structural subunits of hospitals and polyclinics, and every year, more than 900,000 tests are performed for monitoring the disinfection-sterilization and epidemic-control conditions.

However, a stable sanitary well-being and absolute adherence to sterilization-disinfection conditions—both of which would prevent hospital infections—have yet to be achieved. That is because virtually all bacteriological laboratories are considerably overloaded. The centralization of clinical-diagnostic testing at health-epidemiological stations nearly 15 years ago does not meet today's needs, because it complicates the diagnosis of infectious diseases and does not provide to the full extent the bacteriological tests called for by the existing orders of the USSR and KaSSR ministries of health in surgical departments, maternity departments, children's departments, or equivalent departments. The situation can be corrected by opening clinical-diagnostic and bacteriological laboratories in all treatment-prevention facilities with 250 beds or more, as well as in infectious hospitals and maternity hospitals regardless of the number of beds they have. That would make it possible to free up some of the production capacities of the bacteriological laboratories of the health-epidemiological facilities and strengthen control of the sanitary-bacteriological background.

The steps taken by the health-epidemiological service in the struggle against tuberculosis primarily in the 46 most heavily affected rural areas must be regarded as positive. In each of those areas, a differentiated complex of sociopreventive and epidemic-control measures has been developed. The implementation of that complex is sure to have positive results. And the closer the cooperation among epidemiologists, phthisiatrists, and workers of the general treatment system in the struggle against the spread of that disease, the more palpable the results will be.

Concern is justified with regard to the state of the environment, and not just in regions that have been declared ecological disaster zones (the Aral region and Semipalatinsk). In the interests of the matter, we feel it advisable to demarcate the functions of the State Committee for Environmental Control and the health-epidemiological service. The following principle must serve as the basis: all work involving environmental protection—including the development of environmental protection measures and monitoring of the observance of them—should be the responsibility of the State Committee. But facilities of the health-epidemiological service, together with specialized scientific research institutes, departments of medical institutes, and other science facilities, are studying (if there is a need) the effects suffered by public health from certain adverse ecological factors and the activity of enterprises. And if a connection is in fact found, we must demand that the State Committee for Environmental Control and local organs of Soviet authority develop and implement environmental protection measures.

The introduction of new technologies and the creation of joint ventures and large general territory/industry-based complexes takes a consolidation of the manpower of science and applied fields. For example, in cooperation with the KaSSR Ministry of Health Scientific Research

Institute of Hygiene and Occupational Diseases, a joint study and assessment was done from a health point of view with regard to the possibilities of using the enormous deposits of secondary raw material for construction purposes. In addition, various sorts of work were done to evaluate working conditions at enterprises of the phosphorus and petroleum-refining industry and nonferrous metallurgy. A preventive health inspection is being done to determine whether ecologically clean waste-free measures have been implemented. The use of a number of technological innovations has made it possible last year to reduce occupation-related poisonings in the republic by 23.8 percent in comparison with the previous year. Favorable trends have been noted in a number of occupational pathologies, especially phosphorus intoxication (2.5-fold drop) and dermatosis (a 30 percent drop).

Some success has been noted in the prevention of occupation-related morbidity, although its level remains high. As before, poor working conditions underlie the morbidity of sound-vibration and dust etiologies, which account for 27.1 percent and 25.7 percent, respectively, of all cases of occupational diseases. Morbidity for those etiologies grew by 33 percent and 48.3 percent in 1990, primarily among workers at enterprises of the coal and mining industry.

And noteworthy is the fact that in 1990, some 62 million days were lost because of illness; that is, every day, more than 800,000 individuals took off from work. Specialists in labor hygiene must not only recommend hygienically sound measures to improve the production environment—they must also monitor strictly the adherence to health-and-hygiene conditions in every workplace, the use of protective clothing, and the organization of amenities for workers, as well as preventive medical measures.

The activity of the health-epidemiological service in recent years has acquired a clear orientation toward the preservation of the health of the generation growing up. In that context, problems have been addressed with regard to the improvement of health-and-hygiene measures in preschool facilities and in schools, nutrition and physical development, sensible combination of work and recreation, and reduction of infectious morbidity. It is in recent years that overcrowding in preschool facilities has dropped (to 3.8 percent in 1990 from 12 percent in 1985), lighting has been improved (by 3.5 percent), and the percentage of students receiving hot meals is growing on a daily basis. Finally, adolescents have been banned from working in tobacco and cotton harvests. Morbidity among children attached to organizations has dropped 2.5-fold for dysentery, and positive trends have been noted in somatic morbidity.

For solving problems facing the health-epidemiological service of the republic, of no small significance is the shoring up of its material-technical base, which today leaves something to be desired. Suffice it to say that only 13.8 percent of the health-epidemiological stations are in standard facilities, 76.9 percent are in adapted facilities, and 9.3 percent are in emergency facilities. The realities are such that many laboratories are unable to fully use the equipment and instruments they have; nor can they expand the range or nomenclature of research or introduce new techniques.

With the ever growing influence of the health-epidemiological service, the role is growing for the chief physicians of its facilities who in using every possible source of financing are obliged to take the necessary measures for the development of the material-technical base and for the acquisition of modern, highly accurate equipment.

Hygienic Aspects of the Development of an Integrated Data Base for an Automated Toxicologist Work Station

917C0589 Moscow GIGIYENA I SANITARIYA in Russian No 2, Feb 91 pp 72-73

[Article by G. I. Sidorenko, G. N. Krasovskiy, Z. I. Zholdakova, N. V. Zaytseva, Ya. I. Vaysman, A. v. Antskaytis, G. F. Smirnova, D. A. Gimervert, Scientific Research Institute of General and Communal Hygiene imeni A. N. Sysina, USSR Academy of Medical Sciences, Moscow; Perm Polytechnic Institute]

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[Text] An automated work station (ARM) for a toxicologist is intended to provide procedural, informational, and statistical support for health research in the assessment and accelerated control of harmful substances in the environment on the basis of the structurally similar search, optimal planning of experiments, and mathematical modelling and prediction of toxicometric parameters. The toxicologist ARM is a data-research complex that includes a database, expert systems, and computer-experimenter systems.[1] The introduction of a toxicologist ARM makes it possible to optimize and minimize time and labor expenses, standardize experimental work procedures, and provide a high degree of precision and reliability to health controls. The material base of the ARM is made up of IBM PC XT/AT personal computers or clones with a 20-40 MB RAM. Work with the system is done in dialog mode in professional user language. The data-research complex of the ARM enables use of application-programs packages for searching, statistical processing of data, experiment planning, and mathematical modelling either independently or in the form of built-in procedures in expert systems or computer-experimenter systems.

Functionally, the toxicologist ARM is realized on the following levels:

—integrated data base (data-retrieval system)

—expert (training) systems

—research systems (computer-experimenter)

This paper presents the results of efforts to realize the first level—the creation of an integrated database for tasks involving health assessment and accelerated control of harmful substances in the environment. The integrated database (IDB) of the toxicologist ARM is designed for data support of a broad circle of tasks involved in health control of harmful substances in the water of water bodies, in the atmosphere, and in the soil. It is geared to the physician-hygienist, the toxicologist, and the specialist in health control of harmful chemical factors in the environment. The ARM IDB can work in a broad range of subject-based user questions of agencies of practical health care, of the USSR and republic-level ministries of health, of state control, of scholarly and research organizations and institutions of the USSR Academy of Sciences and the USSR Academy of Medical Sciences, of the USSR State Committee for Public Educations, and of industrial enterprises. The IDB is assembled in both Russian and English and can be used by foreign hygienists, clinicians, ecologists, and specialists in preventive medicine and environmental protection.

The IBD contains information on the characteristics of compounds controlled in the USSR in the environment, with the quantity of initial requisites for each substance from 20 to 70 or more. The information on each specific compound is entered in the IDB within the guidelines of the International Classification of Substances JUPAK by chemical class, group, and subgroup. Data on the substances contained in the IDB is summarized in subject data bases in the following sections:

—physicochemical properties of the substance

—parameters of organoleptic and reflex action

—toxicometric parameters and clinical picture of acute intoxication

—parameters and nature of influence on processes of natural self-cleansing of reservoirs

—cumulative properties and subacute toxicity

—parameters of chronic toxicity

—skin-irritating and skin-resorptive action

—kinetic and metabolic criteria

—long-term effects (gonadotoxic, embryotoxic, mutagenic, etc.)

—normatives of content in the environment and the workplace that limit the signs of damage

—characteristics of the method of determination in the environment

—bibliography

The IDB makes it possible to perform a quick search, screening sampling, and a systematization of information on the basis of the requests of the user in various reserves of the database; in addition, information can be exchanged between subject (private) databases and the IDB.

The control system for the IDB works in the dialog mode in terms of the subject field and does not require that the user have special knowledge of the field of information science. A subject sample from the database on the basis of the requests of the user is performed in the form of a report on the screen or the printer. The system makes it possible to work with all the elements of the IDB at the same time or with each separately. The functional features of the base allow for constant entry of new information, i.e., work in a replenishing mode, in the IDB; to classify it; to extract it in accordance with the needs of

the user either comprehensively or according to certain principles; to use various types of screening; to print and duplicate the extracted information in the context of preassigned or newly assigned forms of questions. The IDB software is run on DBASE-III with original user programs.

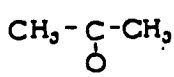
A copy of the screen of the profile of the subject database (physicochemical properties) is presented below.

Copy of profile screen of subject-based data base

General information

Chemical name—dimethylketone Trade name—acetone Synonyms—propanol, acetone

Structural formula



Empirical formula CH_3-CO-CH_3

Degree of purity—99.5 percent Code—23

Note: Basic synthesis, solvent

Physicochemical properties

Aggregate state—liquid

Aggregate state in air—vapor

Color—colorless

Smell—specific

Molecular mass—58.08 g/mol

Melting point—95.0°C

Boiling point—56.2°C

Spontaneous ignition temperature—no data

Flash point—no data

Vapor pressure—226.3 Pa

Particle size—no data

Concentration limits of explosive range: upper—711 lower—no data

Solubility: in water—unlimited in organic solvents—unlimited in fats—unlimited

Degree of hydrolyzation—0 percent

Duration of hydrolyzation—is not hydrolyzed

Degree of polymerization—0 percent

Duration of polymerization—is not polymerized

Dipole moment—1.55 debye

Work of yield—101.0 J/mol

Internuclear distance—10.01 angstroms [&] 20/D—0.79 D 20/4—0.112

Heat of combustion—1180.11 KPK/mol [not further expanded]

Thermal conductivity—no data

Density—0.719 g/cm^3

Viscosity at 20°C—no data

Hunch [Khanch] constant—7.001

Octanol/water distribution coefficient—no data

Gamet constant sum—151.09

Free valence index—11

Molecular refraction—no data

Energy of excitation—no data

Ionization constant—no data

Bond energy constant—27.11

Energy of mesomerism—no data

C-C bond length—no data

Multiplicity of bonds—no data

Bond dissociation energy—no data

Number of metal atoms in molecule—none

Sum of increments of nuclear quadrupole resonance—no data

Energy of higher filling of molecular orbit—no data

Energy of lower filling of molecular orbit—no data

Energy of resonance—no data

For solving problems associated with the planning and statistical processing of the results of modeling and predicting toxicometric and hygienic parameters, it is possible to install user programs written in high-level languages (Basic, Pascal). The functional capabilities of the system of control enable the consolidation in one information base all the stages of scientific research on health assessment and control of harmful materials in the environment, greater reliability of scientific results, and substantially lower labor-intensity of research because the research is on a fundamentally higher level.

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